Oerlikon 81 mm Rocket DIRA-3

with hollow charge warhead 3,0 kp — Type RAK 016

Main Characteristics

- Unguided solid fuel rocket with folding fins
- Pure internal burning propulsive element type TWK 004-1
- Hollow charge warhead type PI-3

Use

- As air-to-ground rocket from aircraft and helicopters
- As ground-to-ground rockets from vehicles
- Discharge from automatic rocket launchers and multi-tube rocket launchers
- For engagement of armoured point targets and area targets

Technical Data

Rocket type RAK 016

• Weight of rocket ready to fire		11,65 kp
• v_0 from ground (3 m tube)	ca.	57 m/sec
• v max. from ground at +18 °C	ca.	685 m/sec
• Average acceleration at +18 °C	ca.	500 m/sec²
• Action time at +18 °C	ca.	0,91 sec
• End of burning after	ca.	400 m
• Maximum spin after ca. 0,85 sec	ca.	2500 rpm
• Muzzle safety	min.	15 m
• Release of fins from retaining ring after start of thrust	ca.	0,04 sec
• Delay in tube after start of thrust at +18 °C (3 m)	ca.	0,15 sec
• Travel of rocket from muzzle of tube during opening time of the brakes to locking	ca.	2 m
• Ignition current		1 A
• Ignition voltage (direct current)		24 V
• Dispersion 50%	ca.	7 ‰
• Temperature range		–40 °C to +60 °C

Propulsive Element type TWK 004-1

• Propulsive element with folding fins		
• Righthanded spin imparted by ring on nozzle end (12°)		
• Steel pressure chamber, nozzle and fins		
• Electric ignition through a contact ring and earth at the nozzle end		
• Weight of propulsive element incl. propellant charge		8,65 kp
• Weight of propellant charge		3,34 kp
• Action time	at –40 °C	ca. 1,00 sec
	at +18 °C	ca. 0,91 sec
	at +70 °C	ca. 0,82 sec
• Thrust (mean value)	at +18 °C	ca. 785 kp
• Specific impulse	at +18 °C	ca. 215 sec
• Combustion chamber pressure (mean value)	at +18 °C	ca. 160 kp/cm²
• Ignition delay (mean value)	at +18 °C	ca. 0,02 sec
• Ignition resistance		1,0–3,0 Ω

Hollow Charge Warhead type PI-3

• Mechanical ignition system with impact fuze and safety device		
• Penetration performance	ca.	300 mm
• Weights: Explosive	ca.	0,7 kp
Shell ready for firing	ca.	3,0 kp

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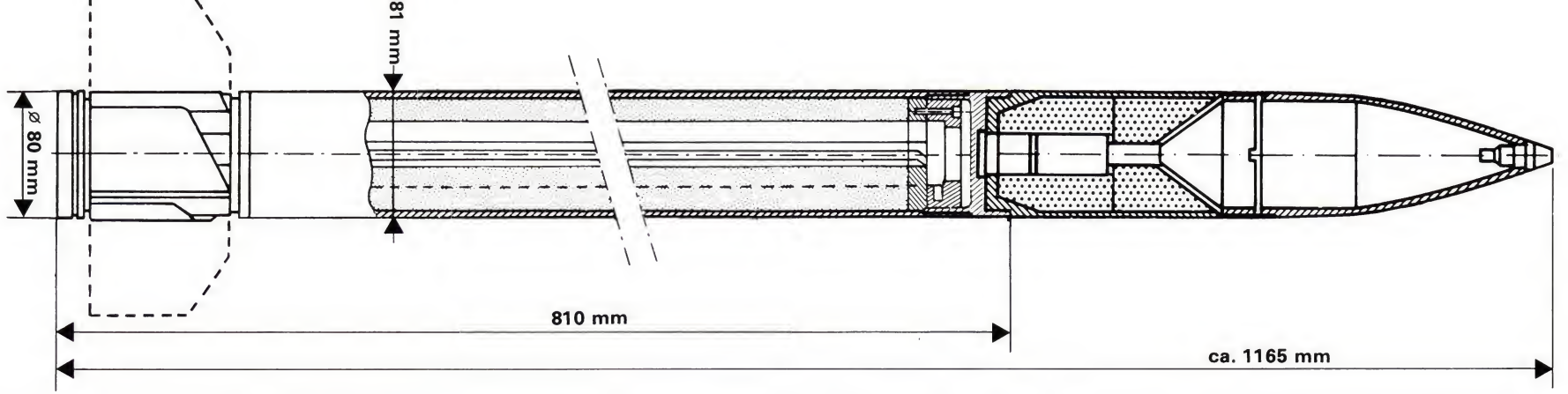
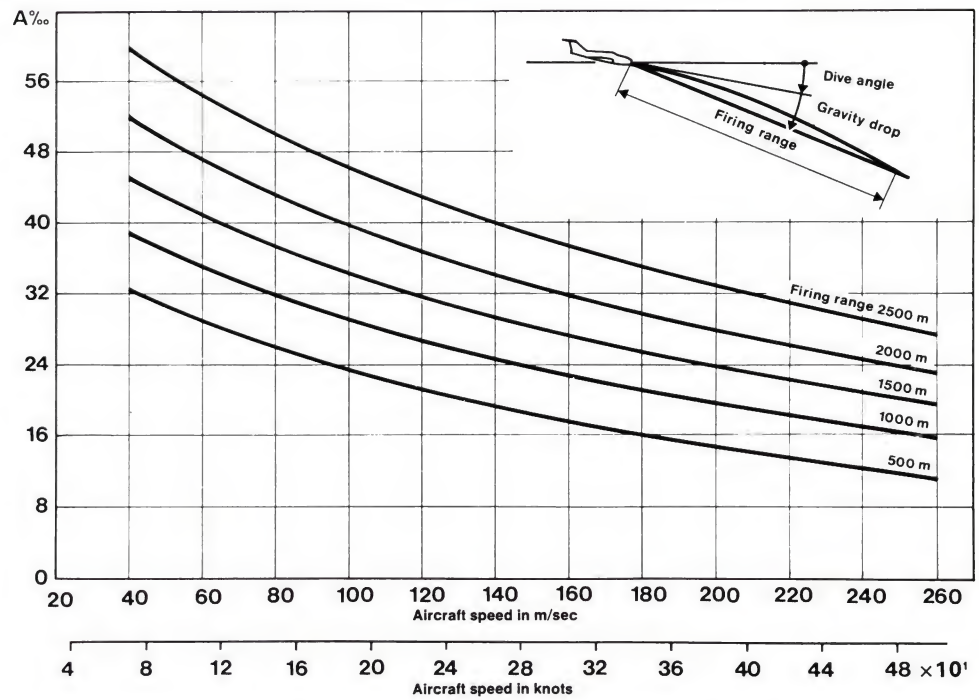


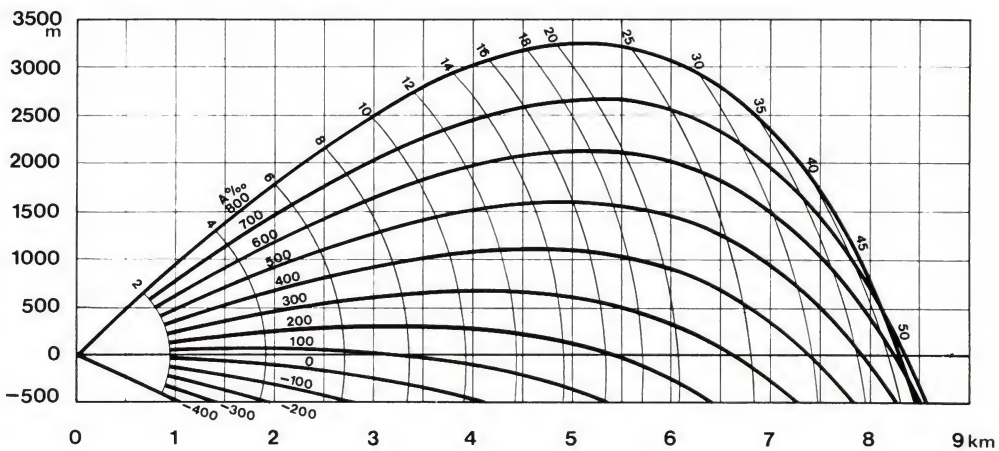
Gravity drop at 20° dive angle

Altitude on release of rockets 800 m
Original diagram RAE-report 153 page 6



Trajectory diagram

Muzzle horizon 0 m above sea level
Standard atmosphere DIN 5450 (ICAO)
C_w-diagram 125 D 2340
Original diagram WW 850 006



WWW 300 230 E 1974

Oerlikon 81 mm Rocket DIRA-3

with fragmentation explosive shell 3 kp — Type RAK 015

Main Characteristics

- Unguided solid fuel rocket with folding fins
- Pure internal burning propulsive element type TWK 004-1
- Mechanical impact fuze
- Fragmentation explosive shell type US-3

USE

- As air-to-ground rocket from aircraft and helicopters
- As ground-to-ground rocket from vehicles and ships
- Discharge from automatic rocket launchers and multi-tube rocket launchers
- For engagement of area targets

Technical Data

Rocket type RAK 015

• Weight of rocket ready to fire		11,65 kp
• v_0 from ground (3 m tube)	ca.	57 m/sec
• v max. from ground at +18 °C	ca.	685 m/sec
• Max. range from ground	ca.	8,5 km
• Average acceleration at +18 °C	ca.	500 m/sec²
• Action time at +18 °C	ca.	0,92 sec
• End of burning after	ca.	400 m ,
• Maximum spin after ca. 0,85 sec	ca.	2500 rpm
• Muzzle safety	ca.	0,3 sec
	min.	20 m
• Release of fins from retaining ring after start of thrust	ca.	0,04 sec
• Delay in tube after start of thrust at +18 °C (3 m)	ca.	0,15 sec
• Travel of rocket from muzzle of tube during opening time of the brakes to locking	ca.	2 m
• Ignition current		1 A
• Ignition voltage (direct current)		24 V
• Dispersion 50% from aircraft	ca.	7 ‰
• Temperature range		–40 °C to +60 °C

Propulsive Element type TWK 004-1

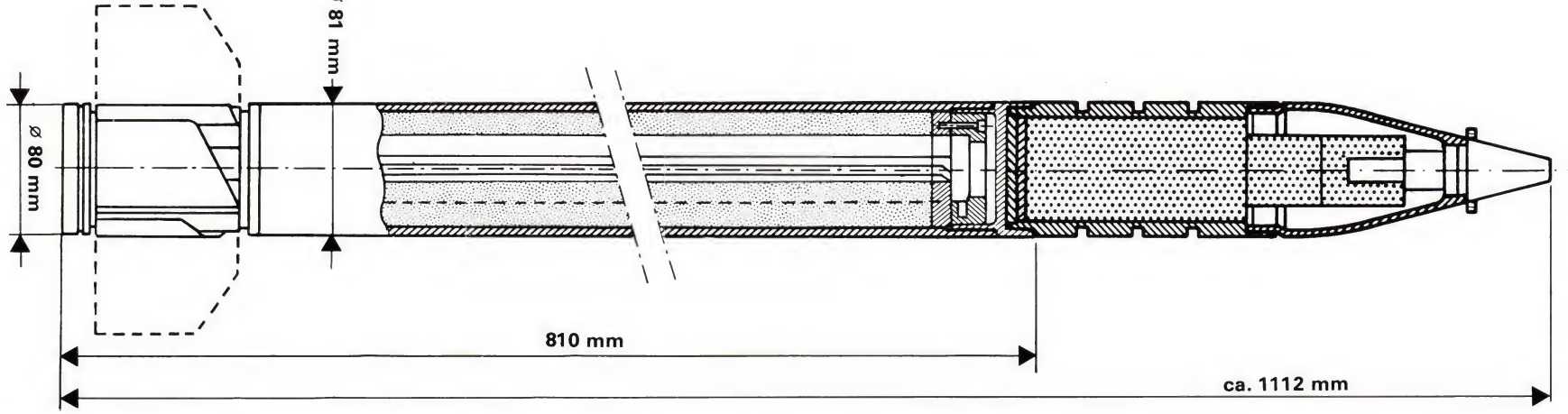
• Propulsive element with folding fins		
• Righthanded spin imparted by ring on nozzle end (12°)		
• Steel pressure chamber, nozzle and fins		
• Electric ignition through a contact ring and earth at the nozzle end		
• Weight of propulsive element incl. propellant charge		8,65 kp
• Weight of propellant charge		3,34 kp
• Action time	at –40 °C	ca. 1,00 sec
	at +18 °C	ca. 0,91 sec
	at +70 °C	ca. 0,82 sec
• Thrust (mean value)	at +18 °C	ca. 785 kp
• Specific impulse	at +18 °C	ca. 215 sec
• Combustion chamber pressure (mean value)	at +18 °C	ca. 160 kp/cm²
• Ignition delay (mean value)	at +18 °C	ca. 0,02 sec
• Ignition resistance		1,0–3,0 Ω

Fragmentation Explosive Shell type US-3

• Fragmentation and explosive effect		
• Weights: Explosive TNT		ca. 0,87 kp
Steel body		ca. 1,95 kp
Fuze		ca. 0,18 kp
Shell ready for firing		ca. 3,00 kp

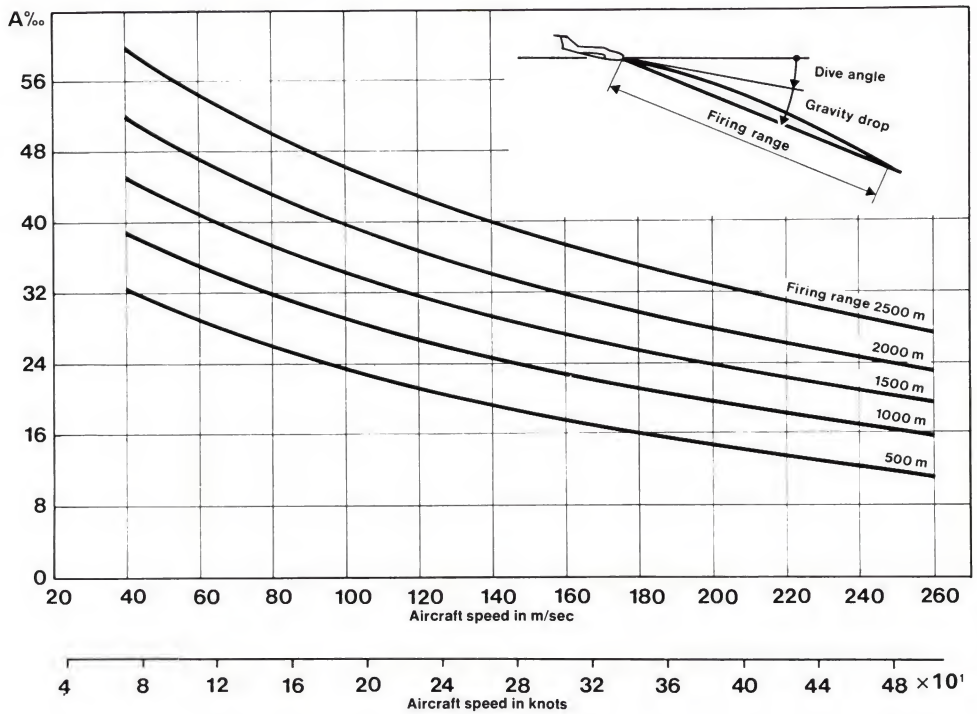
Fuze

- Mechanical impact fuze
- Arming dependent on the temperature of the propulsive element after max. 100 m
- Drop safety 2 m on any ground



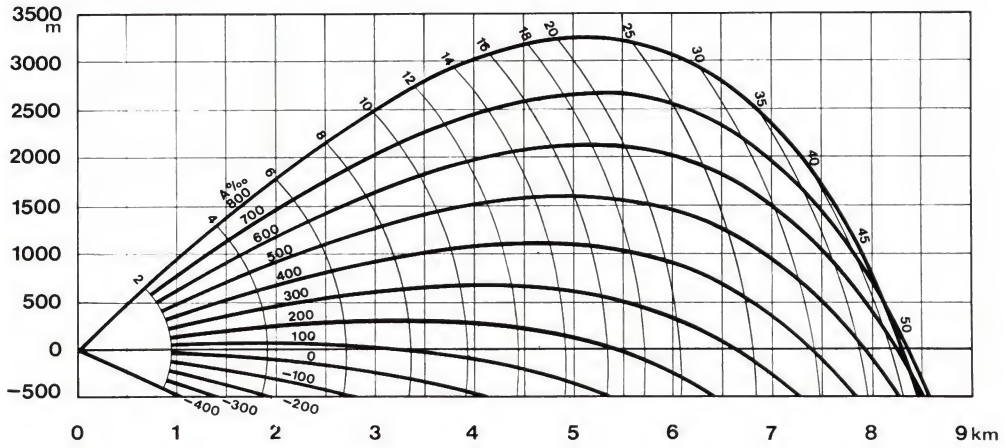
Gravity drop at 20° dive angle

Altitude on release of rockets 800 m
Original diagram RAE-report 153 page 6



Trajectory diagram

Muzzle horizon 0 m above sea level
Standard atmosphere DIN 5450 (ICAO)
C_w-diagram 125 D 2340
Original diagram WW 850 006



Oerlikon 81 mm Rocket DIRA

with fragmentation explosive shell 7 kp — Type RAK 007

Main Characteristics

- Unguided solid fuel rocket with folding fins
- Pure internal burning propulsive element type TWK 004
- Nose fuze KZX 316
- Fragmentation explosive shell type SSK 018

Use

- As air-to-ground rocket from aircraft and helicopters
- As ground-to-ground rocket from vehicles and ships
- Discharge from automatic rocket launchers and multi-tube rocket launchers
- For engagement of area targets

Technical Data

Rocket type RAK 007

Weight of rocket ready to fire		15,65 kp
v_0 from ground (3 m tube)		ca. 48 m/sec
v max. from ground	at +18 °C	ca. 490 m/sec
Max. range from ground		ca. 8,5 km
Average acceleration	at +18 °C	ca. 500 m/sec²
Action time	at +18 °C	ca. 0,91 sec
End of burning after		ca. 270 m
Max. spin after ca. 0,85 sec		ca. 3000 rpm
Muzzle safety		min. 15 m
Release of fins from retaining ring after start of thrust		ca. 0,04 sec
Delay in tube after start of thrust at +18 °C (3 m)		ca. 0,12 sec
Travel of rocket from muzzle of tube during opening time of the brakes to locking		ca. 2 m
Ignition current		1 A
Ignition voltage (direct current)		24 V
Temperature range		–40 °C to +60 °C

Propulsive Element type TWK 004

- Propulsive element with folding fins
- Righthanded spin imparted by ring on nozzle end (12°)
- Steel pressure chamber, nozzle and fins
- Electric ignition through a contact ring and earth at the nozzle end
- Weight of propulsive element incl. propellant charge 8,65 kp
- Weight of propellant charge 3,34 kp
- Action time at –40 °C ca. 1,00 sec; at +18 °C ca. 0,91 sec; at +70 °C ca. 0,82 sec
- Thrust (mean value) at +18 °C ca. 785 kp
- Specific impulse at +18 °C ca. 215 sec
- Combustion chamber pressure (mean value) at +18 °C ca. 160 kp/cm²
- Ignition delay (mean value) at +18 °C ca. 0,02 sec
- Ignition resistance 1,0–3,0 Ω

Fragmentation Explosive Shell type SSK 018

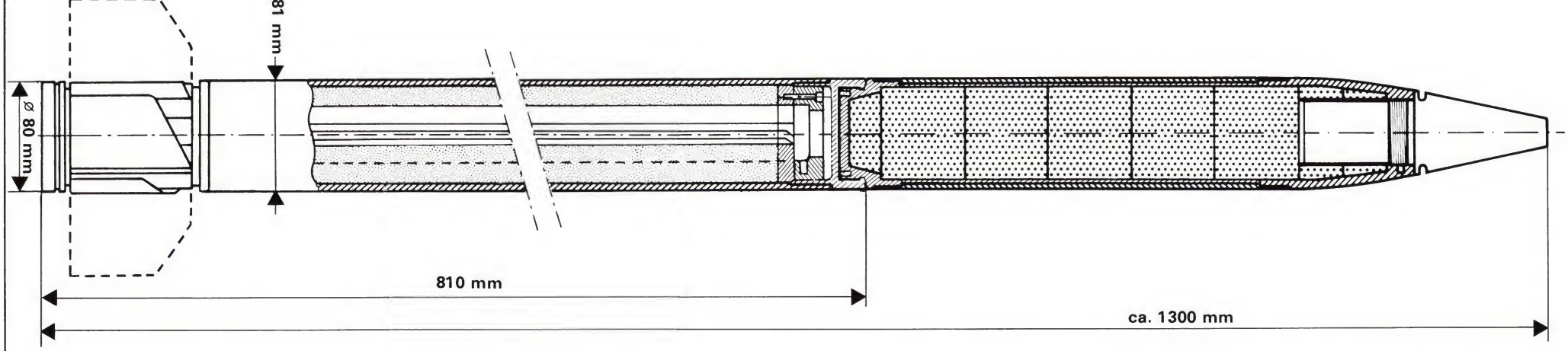
- Mechanical ignition system with nose fuze and safety element
- Shell suitable for the following fuzes:
  - Instantaneous fuze (MZ)
  - Instantaneous-delay action fuze (MVZ)
  - Instantaneous-time fuze (MZZ)
- Explosive: Hetro 85/15, 7 Pellets, Density ca. 1,8 p/cm³
- Weights:

Nose fuze	1,00 kp
Shell empty	3,80 kp
Explosive	2,20 kp
Shell ready for firing	7,00 kp

- Fragmentation effect min. 1 fragment/m² at 30 m distance
- Fragment weight ca. 1 p
- Number of fragments 2500–3000 pieces
- Initial velocity of fragments v_0 1600–2200 m/sec

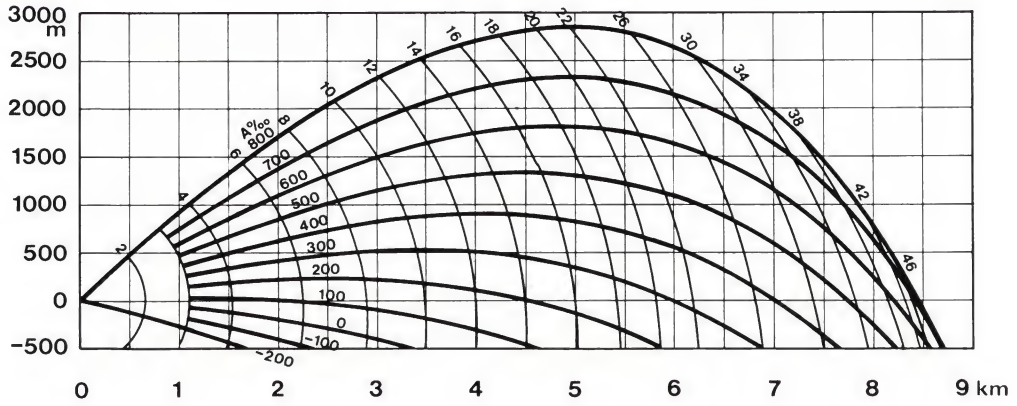
Nose Fuze type KZX 316

- Detonator safety since detonator is situated outside chain of ignition
- Drop safety on steel plate 2 m
- Muzzle safety 15–60 m
- Sensitivity down to about 15° angle of impact lower angle of impact with a ricocheting MVZ head
- Device for arming dependent on duration of acceleration
- Armed on live trajectory
- Operational safety:
  - Acceleration min. 35 g
  - Revolutions max. 2000 rpm
- Weights:
  - 7 Pellets 1 p Hexoplast 4
  - 4 Booster pellets 180 p Hexoplast 4
  - Nose fuze ready to fire 1000 p



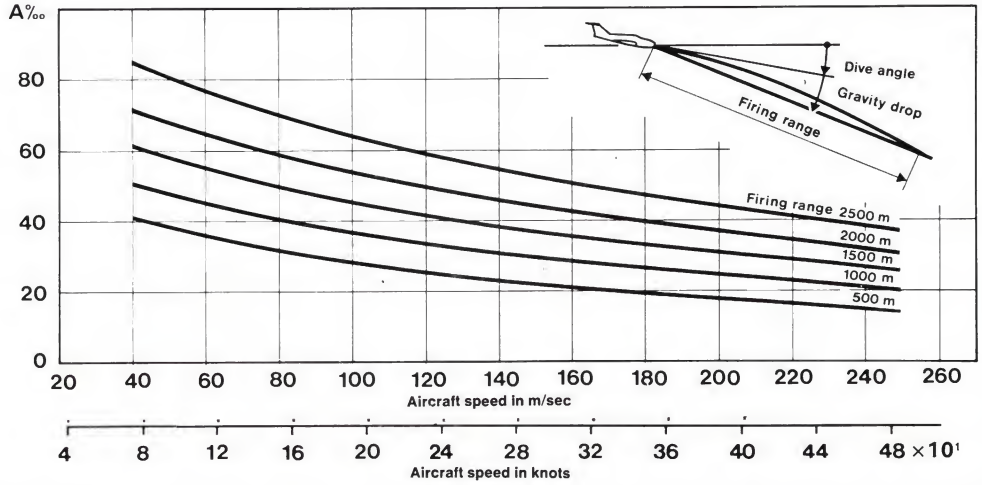
Trajectory diagram

Muzzle horizon	0 m above sea level
Standard atmosphere	DIN 5450 (CINA)
C_w-diagram	D 2340×1,25
Original diagram	D 3447



Gravity drop at 20° dive angle

Altitude on release of rockets	800 m
Original diagram	RAE-report 106 page 10



WWW 300 180 E 1974

Oerlikon 81 mm Rocket DIRA-3

with incendiary-blast shell 3 kp — Type RAK 012

Main characteristics

- Unguided solid fuel rocket with folding fins
- Pure internal burning propulsive element type TWK 004-1
- Mechanical impact fuze
- Incendiary-blast shell type UIS-3

Use

- As air-to-ground rocket from aircraft and helicopters
- As ground-to-ground rocket from vehicles and ships
- Discharge from automatic rocket launchers and multi-tube rocket launchers
- For engagement of area targets

Technical Data

Rocket type RAK 012

• Weight of rocket ready to fire			11,65 kp
• v_0 from ground (3 m tube)		ca.	57 m/sec
• v max. from ground	at +18 °C	ca.	685 m/sec
• Max. range from ground		ca.	8,5 km
• Average acceleration	at +18 °C	ca.	500 m/sec²
• Action time	at +18 °C	ca.	0,92 sec
• End of burning after		ca.	400 m
• Maximum spin after ca. 0,85 sec		ca.	2500 rpm
• Muzzle safety		ca.	0,3 sec
		min.	20 m
• Release of fins from retaining ring after start of thrust		ca.	0,04 sec
• Delay in tube after start of thrust at +18 °C (3 m)		ca.	0,15 sec
• Travel of rocket from muzzle of tube during opening time of the brakes to locking		ca.	2 m
• Ignition current			1 A
• Ignition voltage (direct current)			24 V
• Dispersion 50% from aircraft		ca.	7 ‰
• Temperature range			–40 °C to +60 °C

Propulsive Element type TWK 004-1

• Propulsive element with folding fins			
• Righthanded spin imparted by ring on nozzle end (12°)			
• Steel pressure chamber, nozzle and fins			
• Electric ignition through a contact ring and earth at the nozzle end			
• Weight of propulsive element incl. propellant charge			8,65 kp
• Weight of propellant charge			3,34 kp
• Action time	at –40 °C	ca.	1,00 sec
	at +18 °C	ca.	0,91 sec
	at +70 °C	ca.	0,82 sec
• Thrust (mean value)	at +18 °C	ca.	785 kp
• Specific impulse	at +18 °C	ca.	215 sec
• Combustion chamber pressure (mean value)	at +18 °C	ca.	160 kp/cm²
• Ignition delay (mean value)	at +18 °C	ca.	0,02 sec
• Ignition resistance			1,0–3,0 Ω

Incendiary-Blast Shell type UIS-3

• Blast and incendiary effect		
• Weights: Explosive	ca.	1,50 kp
Steel body	ca.	1,32 kp
Fuze	ca.	0,18 kp
Shell ready for firing		3,00 kp

Fuze

- Mechanical impact fuze
- Arming dependent on the temperature of the propulsive element after max. 100 m
- Drop safety 2 m on any ground

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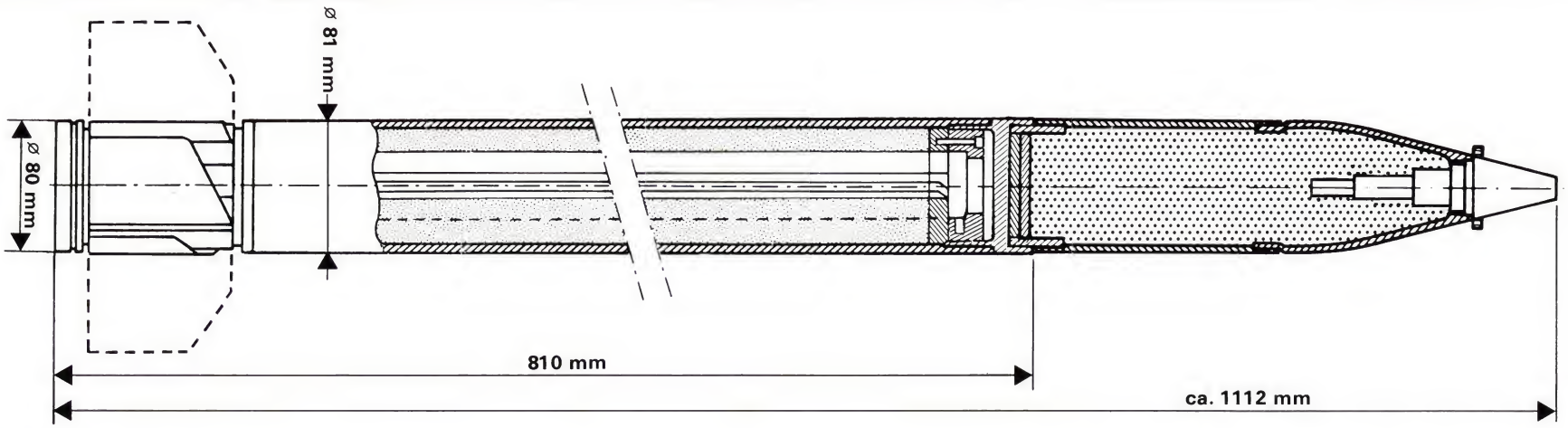
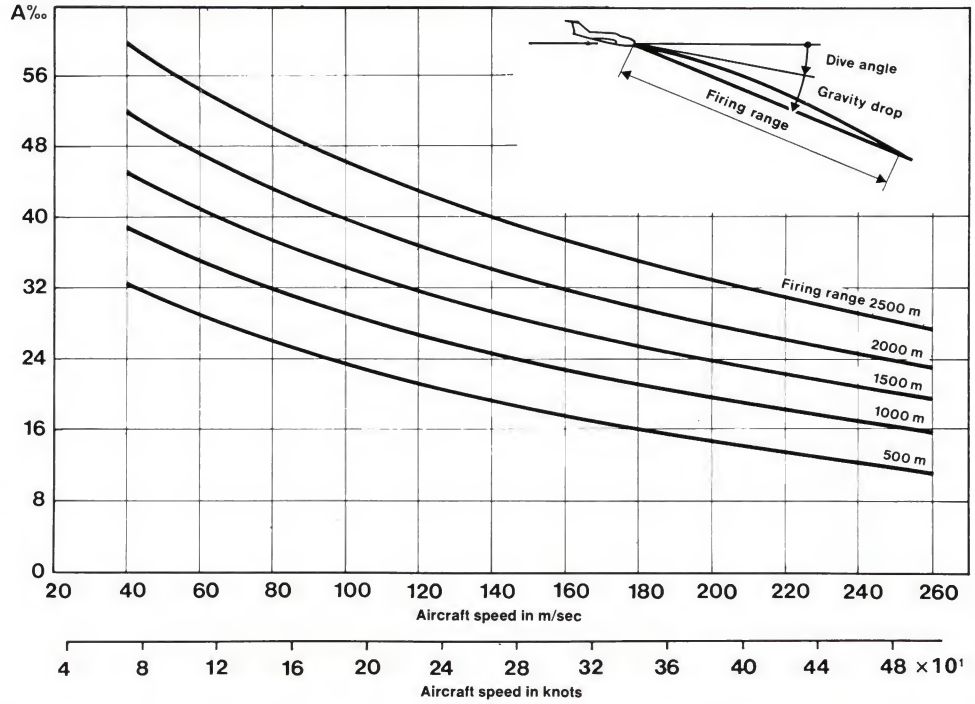


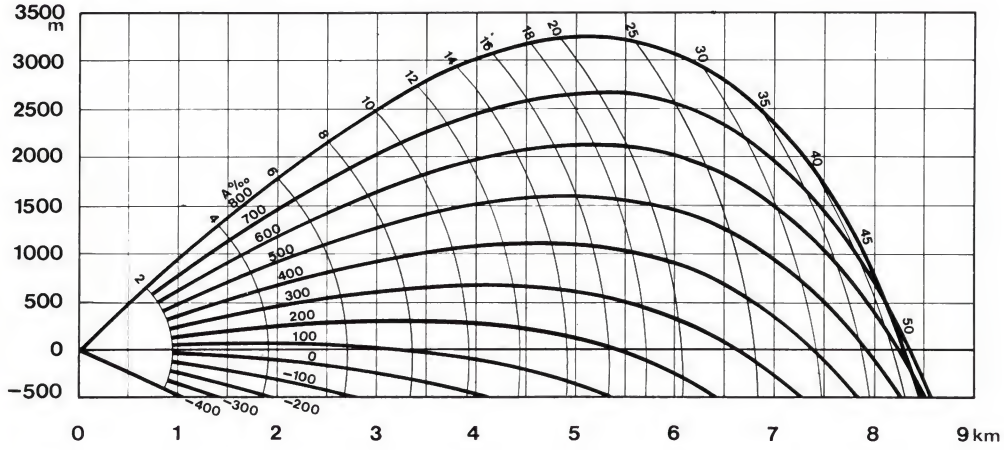
Gravity drop at 20° dive angle

Altitude on release of rockets 800 m
Original diagram RAE-report 153 page 6



Trajectory diagram

Muzzle horizon 0 m above sea level
Standard atmosphere DIN 5450 (ICAO)
C_w-diagram 125 D 2340
Original diagram WW 850 006



WWW 300 200 E 1974

Oerlikon 81 mm Rocket DIRA

with marker shell 7 kp

Type RAK 006

Main Characteristics

- Unguided solid fuel rocket with folding fins
- Pure internal burning propulsive element type TWK 004
- Nose fuze type KZX 316
- Practice shell with explosive marker type USK 017

Use

- As air-to-ground rocket from aircraft and helicopters
- As ground-to-ground rocket from vehicles and ships
- Discharge from automatic rocket launchers and multi-tube rocket launchers
- For practice purposes

Technical Data

Rocket type RAK 006

Weight of rocket ready to fire		15,65 kp
v_0 from ground (3 m tube)		ca. 48 m/sec
v max. from ground	at +18 °C	ca. 490 m/sec
Max. range from ground		ca. 8,5 km
Average acceleration	at +18 °C	ca. 500 m/sec²
Action time	at +18 °C	ca. 0,91 sec
End of burning after		ca. 270 m
Maximum spin after ca. 0,85 sec		ca. 3000 rpm
Muzzle safety		min. 15 m
Release of fins from retaining ring after start of thrust		ca. 0,04 sec
Delay in tube after start of thrust at +18 °C (3 m)		ca. 0,12 sec
Travel of rocket from muzzle of tube during opening time of the brakes to locking		ca. 2 m
Ignition current		1 A
Ignition voltage (direct current)		24 V
Temperature range		–40 °C to +60 °C

Propulsive Element type TWK 004

- Propulsive element with folding fins
- Righthanded spin imparted by ring on nozzle end (12°)
- Steel pressure chamber, nozzle and fins
- Electric ignition through a contact ring and earth at the nozzle end

Weight of propulsive element incl. propellant charge		8,65 kp
Weight of propellant charge		3,34 kp
Action time	at –40 °C	ca. 1,00 sec
	at +18 °C	ca. 0,91 sec
	at +70 °C	ca. 0,82 sec
Thrust (mean value)	at +18 °C	ca. 785 kp
Specific impulse	at +18 °C	ca. 215 sec
Combustion chamber pressure (mean value)	at +18 °C	ca. 160 kp/cm²
Ignition delay (mean value)	at +18 °C	ca. 0,02 sec
Ignition resistance		1,0–3,0 Ω

Practice Shell with Explosive Marker type USK 017

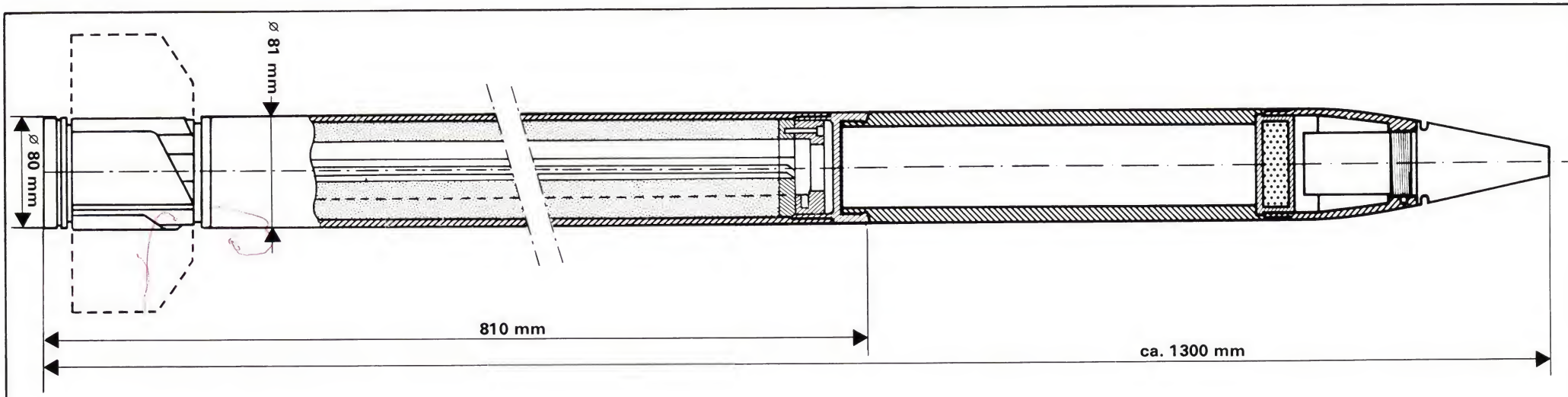
- Mechanical ignition system with nose fuze and safety element
- Shell suitable for the following fuzes:
  - Instantaneous fuze (MZ)
  - Instantaneous-delay action fuze (MVZ)
  - Instantaneous-time fuze (MZZ)
- Smoke marker charge
- Explosive effect through fuze booster according to type 50 p to 180 p explosive
- Weights:

Nose fuze	1,00 kp
Shell empty	5,80 kp
Marker charge casing	0,20 kp
Shell ready for firing	7,00 kp

- Safety distance 300 m

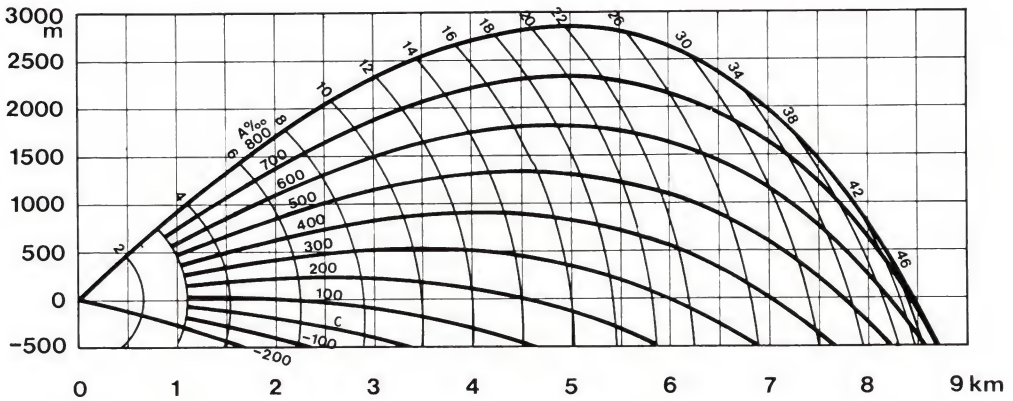
Nose Fuze type KZX 316

- Detonator safety since detonator is situated outside chain of ignition
- Drop safety on steel plate 2 m
- Muzzle safety 15–60 m
- Sensitivity down to about 15° angle of impact lower angle of impact with a ricocheting MVZ head
- Device for arming dependent on duration of acceleration
- Armed on live trajectory
- Operational safety:
  - Acceleration min. 35 g
  - Revolutions max. 2000 rpm
- Weights:
  - 7 Pellets 1 p Hexoplast 4
  - 4 Booster pellets 180 p Hexoplast 4
  - Nose fuze ready to fire 1000 p



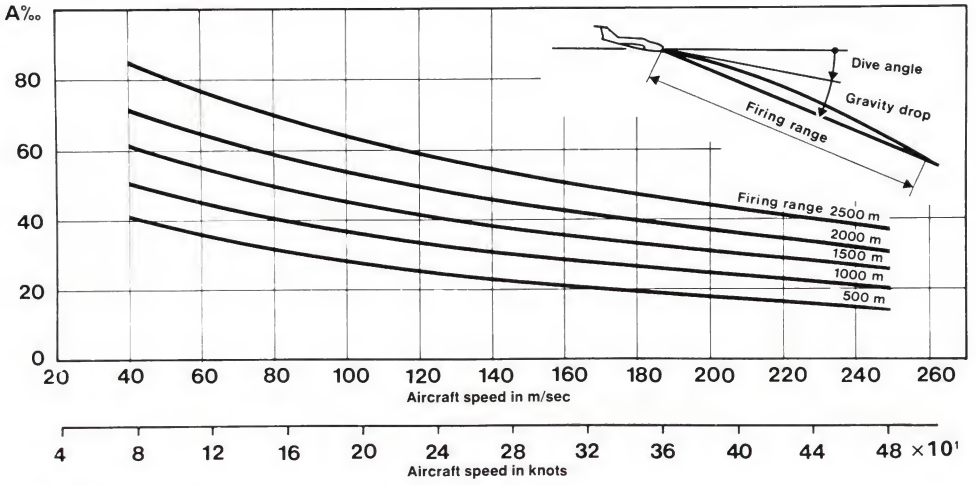
Trajectory diagram

Muzzle horizon	0 m above sea level
Standard atmosphere	DIN 5450 (CINA)
C_w-diagram	D 2340×1,25
Original diagram	D 3447



Gravity drop at 20° dive angle

Altitude on release of rockets	800 m
Original diagram	RAE-report 106 page 10



WWW 300 170 E 1974

OERLIKON

Oerlikon 81 mm Rocket DIRA-3

with practice shell 3 kp — **Type RAK 013**

Main Characteristics

- Unguided solid fuel rocket with folding fins
- Pure internal burning propulsive element type TWK 004-1
- Practice shell type USE-3

Use

- As air-to-ground rocket from aircraft and helicopters
- As ground-to-ground rocket from vehicles and ships
- Discharge from automatic rocket launchers and multi-tube rocket launchers
- For practice purposes

Technical Data

Rocket type RAK 013

- Weight of rocket ready to fire 11,65 kp
- v_0 from ground (3 m tube) ca. 57 m/sec
- v max. from ground at +18 °C ca. 685 m/sec
- Max. range from ground ca. 8,5 km
- Average acceleration at +18 °C ca. 500 m/sec²
- Action time at +18 °C ca. 0,92 sec
- End of burning after ca. 400 m
- Maximum spin after ca. 0,85 sec ca. 2500 rpm
- Release of fins from retaining ring after start of thrust ca. 0,04 sec
- Muzzle safety min. 15 m
- Delay in tube after start of thrust at +18 °C (3 m) ca. 0,15 sec
- Travel of rocket from muzzle of tube during opening time of the brakes to locking ca. 2 m
- Ignition current 1 A
- Ignition voltage (direct current) 24 V
- Dispersion 50% from aircraft ca. 7 ‰
- Temperature range –40 °C to +60 °C

Propulsive Element type TWK 004-1

- Propulsive element with folding fins
- Righthanded spin imparted by ring on nozzle end (12°)
- Steel pressure chamber, nozzle and fins
- Electric ignition through a contact ring and earth at the nozzle end
- Weight of propulsive element incl. propellant charge 8,65 kp
- Weight of propellant charge 3,34 kp
- Action time at –40 °C ca. 1,00 sec
  at +18 °C ca. 0,91 sec
  at +70 °C ca. 0,82 sec
- Thrust (mean value) at +18 °C ca. 785 kp
- Specific impulse at +18 °C ca. 215 sec
- Combustion chamber pressure (mean value) at +18 °C ca. 160 kp/cm²
- Ignition delay (mean value) at +18 °C ca. 0,02 sec
- Ignition resistance 1,0–3,0 Ω

Practice Shell type USE-3

- Steel dummy shell for practice purposes
- Weight 3,0 kp
- External ballistics similar to warheads

Oerlikon 81 mm Rocket DIRA

with practice shell 7 kp

Type RAK 008

Main Characteristics

- Unguided solid fuel rocket with folding fins
- Pure internal burning propulsive element type TWK 004
- Practice shell type UGK 020 with body of fuze

Use

- As air-to-ground rocket from aircraft and helicoptérs
- As ground-to-ground rocket from vehicles and ships
- Discharge from automatic rocket launchers and multi-tube rocket launchers
- For practice purposes

Technical Data

Rocket type RAK 008

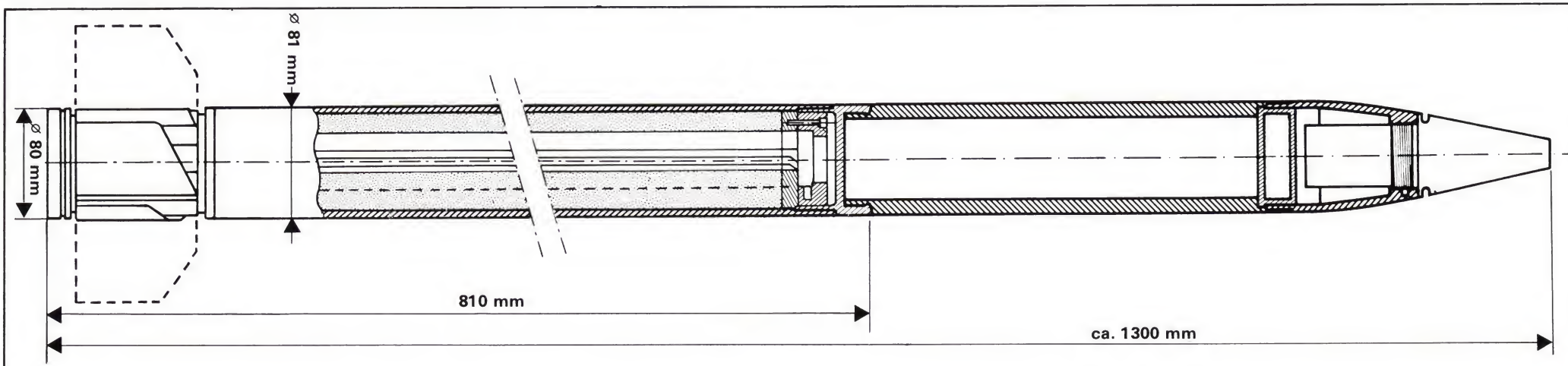
• Weight of rocket ready to fire			15,65 kp
• v_0 from ground (3 m tube)		ca.	48 m/sec
• v max. from ground at +18 °C		ca.	490 m/sec
• Max. range from ground		ca.	8,5 km
• Average acceleration at +18 °C		ca.	500 m/sec²
• Action time	at +18 °C	ca.	0,91 sec
• End of burning after		ca.	270 m
• Maximum spin after ca. 0,85 sec		ca.	3000 rpm
• Muzzle safety		min.	15 m
• Release of fins from retaining ring after start of thrust		ca.	0,04 sec
• Delay in tube after start of thrust at +18 °C (3 m)		ca.	0,12 sec
• Travel of rocket from muzzle of tube during opening time of the brakes to locking		ca.	2 m
• Ignition current			1 A
• Ignition voltage (direct current)			24 V
• Temperature range			–40 °C to +60 °C

Propulsive Element type TWK 004

• Propulsive element with folding fins			
• Righthanded spin imparted by ring on nozzle end (12°)			
• Steel pressure chamber, nozzle and fins			
• Electric ignition through a contact ring and earth at the nozzle end			
• Weight of propulsive element incl. propellant charge			8,65 kp
• Weight of propellant charge			3,34 kp
• Action time	at –40 °C	ca.	1,00 sec
	at +18 °C	ca.	0,91 sec
	at +70 °C	ca.	0,82 sec
• Thrust (mean value)	at +18 °C	ca.	785 kp
• Specific impulse	at +18 °C	ca.	215 sec
• Combustion chamber pressure (mean value)	at +18 °C	ca.	160 kp/cm²
• Ignition delay (mean value)	at +18 °C	ca.	0,02 sec
• Ignition resistance			1,0–3,0 Ω

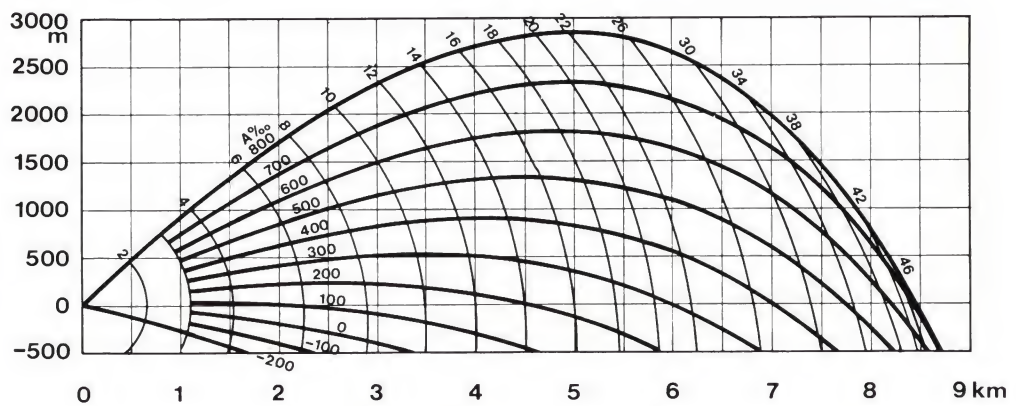
Practice Shell type UGK 020

- Steel dummy shell for practice purposes
- Position of centre of gravity, weight and shape dependent on warhead
- Weight 7 kp
- No fuze



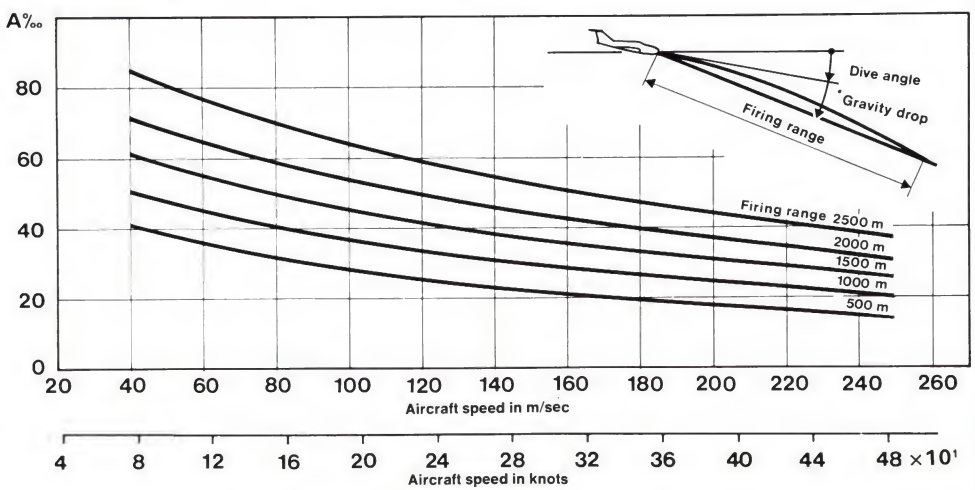
Trajectory diagram

Muzzle horizon	0 m above sea level
Standard atmosphere	DIN 5450 (CINA)
C_w-diagram	D 2340×1,25
Original diagram	D 3447



Gravity drop at 20° dive angle

Altitude on release of rockets	800 m
Original diagram	RAE-report 106 page 10



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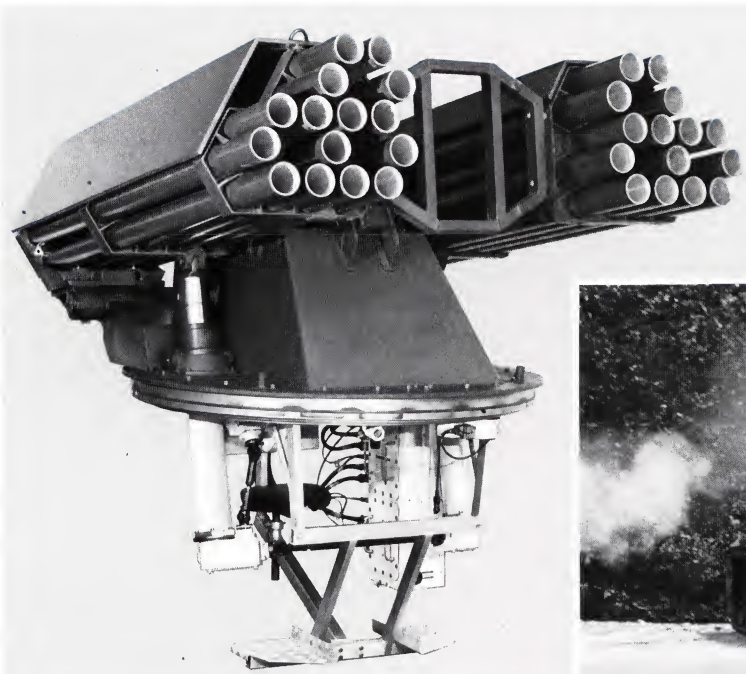
OERLIKON

OERLIKON MILITARY PRODUCTS

Oerlikon 81 mm Multi-Tube Rocket Launcher for SNORA Rockets

Type RWK-014



Main Characteristics

- One man turret with armoured protection
- Equipped with two parallel groups of fifteen tubes each, which are arranged left and right of the cupola
- Each tube easy exchangeable
- Simple loading, reloading time approx. 6 minutes
- Rocket releasing device for single fire in pairs and salvos
- Aiming in traverse and elevation mechanically by hand
- Laying with computer assisted aiming periscope (true azimuth memory)

Use

- For ground-to-ground engagements against area targets
- Suitable for installation on armoured personnel carriers and trucks
- Operational range 4–10 km

Technical Data

- Calibre 81 mm
- Rate of fire 2×300 rounds/min max. 600 rounds/min
- Length of launching tubes approx. 2000 mm

Masses

- Turret with launcher empty approx. 980 kg
- Turret with launcher ready for action without gunner
  - with 30 rockets and 4,5 kg shell approx. 1376 kg
  - with 30 rockets and 7,0 kg shell approx. 1451 kg
  - with 30 rockets and 11,0 kg shell approx. 1571 kg

Aiming Data

	slow gear	quick gear
● Aiming drive with handwheel per revolution:		
– Traverse	2°	8°
– Elevation	0,9°	
● Aiming range:		
– Traverse	unlimited	
– Elevation	–10° to +55°	

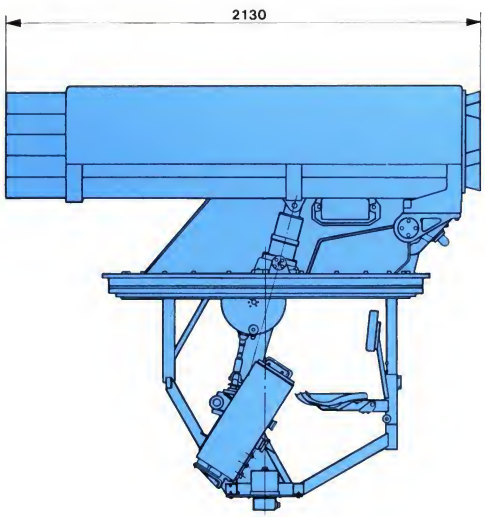
Aiming Equipment

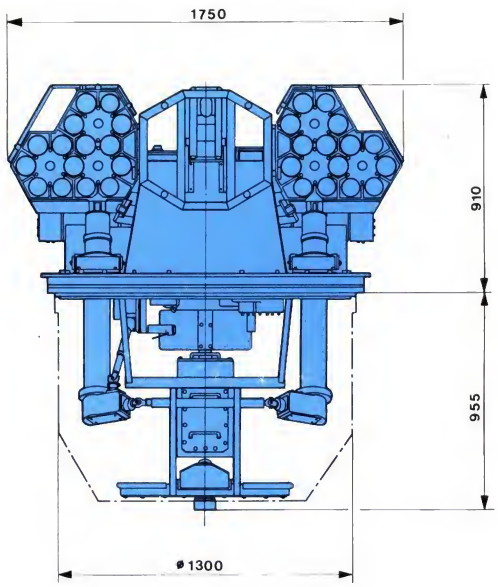
- Aiming periscope type Swarowski
- Magnification 7×
- Field of view 9°
- Slant error correction with true azimuth numbers ±10°
- Reticle illumination adjustable
- Color filter yellow

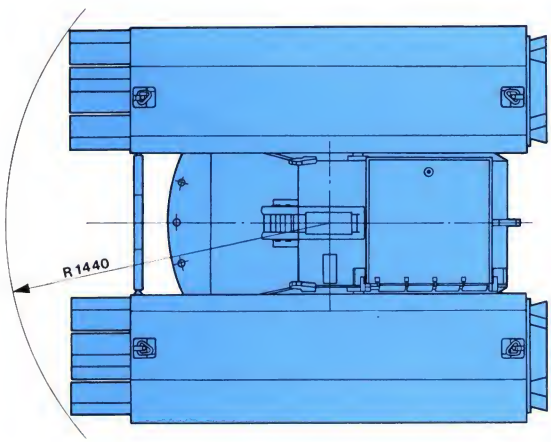
Rockets

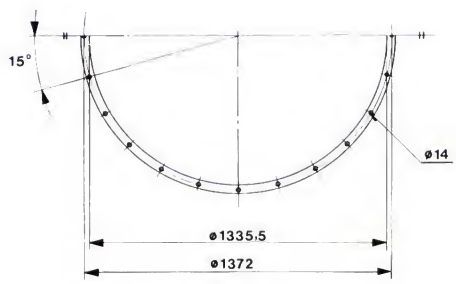
- Oerlikon 81 mm Rocket type SNORA with different types of shells:
  - practice shell (TP)
  - fragmentation explosive shell (HE)
  - high explosive anti tank shell (HEAT)
- Length depending on type of shell 1420–1787 mm
- Initial mass depending on type of shell 13,2–19,7 kg
- Muzzle safety approx. 40 m
- Max. speed depending on type of shell at +18°C 520 to 820 m/s

OERLIKON MILITARY PRODUCTS









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